

DECISION SYSTEMS' QUALIFICATIONS FOR DIAGNOSTIC PROGRAMS

Decision Systems, Inc. has technical personnel with experience in the design and development of effective diagnostic programs. The company has successfully completed and is currently engaged in contracts involving all phases of diagnostic programs; from study and consulting contracts to final design, development and acceptance of diagnostic programs. DSI has successfully completed diagnostic programs for three computer systems and is currently completing three more. Each of these diagnostics was designed to provide the most exhaustive error detection capability and fault isolation in view of the limits imposed by programming state-of-the-art and the logic design.

The first of these diagnostics was developed for the stored program element of the Electronic Data Transmission Control Center which was the heart of the 465L Strategic Air Command, Command and Control System. The central processor was a real-time computer built by ITT. The diagnostics were prepared for the central processor which included three high-speed core memories, drum storage, real-time input/output, magnetic tapes, card reader, card punch and printer. Each program is connected by a common program exercising control over repetition of a particular program, switching from one subsystem test to another,

and all other control functions necessary for the efficient and effective operation of the diagnostic programs. Results of evaluation tests performed by the customer show that these diagnostics detect more than 95% of all faults and that diagnosis is carried to the least number of cards in virtually all cases. Approximately 70% of all failures were diagnosed to five plug-ins or less.

The second full scale diagnostic which has been delivered by DSI was for the Mark I computer. The Mark I is a special-purpose computer built by Link Division of General Precision, Inc. for flight simulation. The Mark I is part of the Gemini Mission Simulator which is used to train the Gemini astronauts. The Mark I is essentially made up of three parallel computers with extensive A/D and D/A input/output facilities. This diagnostic was prepared under a fixed-price contract and has passed acceptance tests.

The third diagnostic program delivered was for the computer complex of the Apollo Mission Simulator which consists of two DDP-24's, one DDP-224, four Mag Tapes, Card Reader, Card Punch, Printer, Typewriter and Paper Tape Punch and Reader.

Decision Systems is also currently engaged in the preparation of diagnostics for the following systems:

- 1) Advanced Scientific Instruments' newly announced ASI 6020 general purpose computer.

2) Johns Hopkins University Applied Physics Laboratory.

Under this contract, DSI is developing a program that will be capable of testing, calibrating and diagnosing faults of the AN/BRN-3 Polaris Navigation System. The system consists of a modified AN/YUK-1 computer, a wired logic data processor, and an RF receiver. The wired logic data processor interfaces the computer with the rest of the system. It contains relays, A/D converters, D/A converters, frequency counters, clocks, and timing circuits in addition to standard digital logic functions.

The AN/BRN-3 Diagnostic Program and Procedures have been designed to enable maintenance personnel to test and diagnose all portions of the AN/BRN-3 system in either an open loop semi-automatic mode or a closed loop automatic mode. The CP-677/BRN-3 computer is used as a tool in the system to test and diagnose itself as well as other portions of the system, for the purpose of detecting and isolating a defect to the smallest number of replaceable modules and with a minimum of operator participation.

3) Rome Air Development Center, Test and Diagnostic Program for the multi-computer, man-machine experiemtnal system.

The test and diagnostic program will be capable of determining the operational capability of the system in any of its various configurations and to diagnose a failure, if one occurs. The experi-

mental system consists of RW400 computers, CDC8090 computers, tape devices, drums, disks, and almost all types of display devices (charactron, CRT's with light gun, etc.)

In addition to the above experience in designing and successfully implementing the above full scale diagnostics, DSI, under contract with the Federal Aviation Agency, has performed a study which describes those computer programs which are necessary to increase the "up time" of the Air Traffic Control Computer facility. The results of the study were submitted as a report to the F. A. A. The report entitled "Computer Programs for Increased Reliability" covered On-Line Maintenance Programs, Off-Line Diagnostics, Automatic Recovery and Control Programs for Duplexed Operations.

Decision Systems, Inc. has successfully completed two consulting contracts for Radio Corporation of America. Under these contracts, Decision Systems, Inc. personnel consulted with RCA, making specific recommendations concerning logic design changes which would enable more effective diagnostics to be written for the new RCA 401 computer and a military computer (MICRORAC).